Self-recording of attention and its effects on achievement

Harvey N. Gross
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SELF-RECORDING OF ATTENTION AND ITS EFFECTS ON ACHIEVEMENT

by

Harvey N. Gross

A Thesis

Submitted in partial fulfillment of the requirements of the
Master of Arts Degree in the Graduate Division
of Rowan College of New Jersey
May 1, 1995

Approved by

Date Approved  May 1, 1995
The purpose of this study is to determine if self-recording of attention to task after cueing improves the performance of learning disabled students. Subjects were fifty-two students in two eighth grade American History classes. The experimental group (n=25) of students had within it a subgroup of thirteen students classified perceptually impaired with moderate to severe attention disorder. Another subgroup of twelve non-learning disabled students within the same class received intervention. The control group (n=27) were all regular education students. Both groups were taught the same lessons using similar formats. A serious limitation of this study is that a small convenience sample was used, not randomly selected, and therefore, not representative of the target population.
The study examines the relationship between attention and academic achievement. Baseline for attention was established with a teacher monitoring of on-task behavior. During the intervention phase, the students were instructed to record their behavior upon hearing an audible cue. Baseline for achievement was established by use of a pretest. Form B of the same test was administered as a post test to students following intervention. Achievement gains were analyzed and the t-test of paired samples was used to determine significance. Descriptive statistics were used to show individual gains in performance for learning disabled students.

Analysis of data shows that while there was no statistical difference between the experimental and control groups. There was a difference between the learning disabled and non-learning disabled students receiving the same intervention. Learning Disabled students, when cued, had scores in time-on-task equal to non-learning disabled students in the control group, and three times higher than non-learning disabled receiving the same intervention. Post test mean scores in achievement for learning disabled students was higher than both the control group and the non learning disabled students in the same room. For all but one student, cueing was helpful for increasing on-task behaviors and achievement for learning disabled students. Results suggest that cueing is an effective teaching strategy for students with Attention Deficit Disorder.
Mini Abstract

Harvey N. Gross

SELF-RECORDING OF ATTENTION AND ITS EFFECTS ON ACHIEVEMENT

1995

Dr. Stanley Urban, Ph.D.

Graduate Program in Learning Disabilities

I investigated the relative effect self-recording of on-task behavior has on academic achievement in eighth grade learning disabled students. Subjects showed significant gains in both attention and achievement. Cueing to increase performance is an effective strategy for classroom teachers.
Acknowledgments

I wish to thank these persons to whom I am indebted:

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Ruth, Lauren and Eric, my family, for their love.
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CHAPTER 1

Introduction

The Problem

The Interagency Committee on Learning Disabilities of the National Institutes of Health estimates that ten to twenty percent of all students have mild to moderate learning and behavior problems that impede educational progress. Given the current U.S. population, this translates into 3.4 to 7.8 million students in public school with a learning disability (N.I.H., 1987).

"If I can only get him to pay attention... Why doesn't he listen?" This question is asked by many teachers year after year. The daydreamer of yesterday is now the focus of intense research and discussion among educators and clinicians throughout the world. Educators are beginning to realize the magnitude of the problem. Conservative estimates of three to six percent of all school age children have symptoms of Attention Deficit Disorder with Hyperactivity (ADHD). Between 1.2 and 3.6 million youngsters are affected. While relationships between inattention and learning have been documented anecdotally for over fifty years, serious empirical research began in 1980 when the American Psychiatric Association classification system for behavioral disorders emerged (A.P.A., 1980). Inclusion of Attention Deficit Disorder in the A.P.A.
So why is Attention Deficit Hyperactivity Disorder receiving so much attention? Bennett & Sally Shaywitz (1992) state that Attention Deficit Disorder is now the most common neurobehavioral disorder of children. Psychiatrist Yeva Rubenstein in a recent article by Judith Winne calls Attention Deficit Hyperactivity Disorder "the illness of the 1990's" (Winne, 1994). For decades, a substantial number of youngsters have been misdiagnosed. Many students were classified either as Neurologically Impaired or Emotionally Disturbed based solely on observable behaviors. Few had the brain dysfunction or chemical imbalance that accompanies such diagnosis. Many of these children could have been educated in the regular classroom if the teacher had had a better understanding of the disorder. As school district business administrators search their budgets for the twenty to thirty thousand dollars needed to send each student to a private school, more ways are being sought to include them within regular education programs.

In addition, Attention Deficit Disorder has important long range consequences. Shickim (1990), and others claim that one-third to one-half of all children diagnosed with attention deficits will carry the disorder with them into adulthood. As adults they demonstrate the same symptoms of inattention and impulsivity in interpersonal relationships and on the job.

The symptoms of Attention Deficit Hyperactivity Disorder center themselves around three behavioral constructs: (1) Inattention (including restlessness,
distractibility, and short attention span), (2) impulsivity; and (3) hyperactivity (including aggression). While impulsivity and hyperactivity are symptoms which inhibit learning, this study will focus on the construct of inattention, and hereafter called Attention Deficit Disorder.

**Purpose of the Study**

The purpose of this study is to determine if self-recording of attention, defined hereafter as exhibiting on-task behavior, improves achievement in eighth grade learning disabled students. Empirical evidence indicates a significant overlap between students with Attention Deficit Hyperactivity Disorder and Learning Disabilities. Many students with Attention Deficit Hyperactivity Disorder have significant academic achievement problems apart from difficulties related to any other disability. They perform below expectation in reading and math, and fall behind in more academic subjects than do children without Attention Deficit Disorder. Holobrow and Berry (1986) claim these children experience "much difficulty in all academic subjects" seven times more frequently than students without Attention Deficit Disorder (p. 417). Given the premise that students with average intelligence with no brain dysfunction should perform the same as students without Attention Deficit Disorder, why do we see such a discrepancy in achievement among Attention Deficit Disorder students? Would achievement levels rise if we could keep them focused on their task of learning?

**Statement of the Research Question**

Studies suggest that if you can improve attention, achievement will increase. (Kneedler & Hallahan, 1981; and Osborne, S., 1987) A review of the literature suggests that the following research question seems important to study:
What connection, if any, is there between attention and achievement for Attention Deficit Disorder students relative to children without Attention Deficit Disorder?

Operating Definitions

*achievement* is defined as a gain in score from pretest to post test.

*Attention* is defined as a state of readiness; a multidimensional concept that involves alertness, arousal, selectivity and vigilance.

*Attention Deficit Disorder* is defined as an individual who exhibits one or more of the following:

1. inattention: the inability to be ready for a specific task.
2. impulsivity: the inability to think before acting; unable to delay gratification.
3. hyperactivity: heightened level of physical activity.

*On-task behavior* is demonstrated when a student is doing one or more of the following at any given moment in time:

1. looking at the speaker
2. looking at the board
3. looking at his/her paper
4. writing

*Self-monitoring* occurs when an individual determines whether or not a specific behavior has occurred, and then self-records the event in some way.

*Time-on-task* is the amount of time (expressed as a percent of total observations) a student is performing on-task behaviors.
Limitations

Findings have limited generalizability because I used a small sample of convenience. There were no Attention Deficit Disorder students in the control group, which threatens the statistical conclusion’s validity. Due to the teachers' schedule, I had to work with a relatively short intervention time span. Finally, the teacher wished to score both pretest and post test calling into question the reliability of the scores because there wasn't a second rater. This is not a serious limitation, however, since the tests were of multiple choice, single answer format.

Summary

Three to five percent of all students, or 1.2-3.6 million children in the United States exhibit Attention Deficit Hyperactivity Disorder symptoms. The need for appropriate classroom interventions is evident. The literature suggests that the time learning disabled students spend in self monitoring their attention levels correlates with increased performance and improved achievement. Does self monitoring of attention improve achievement in eighth grade learning disabled and non-learning disabled students? Are students capable of monitoring their own attention levels? What cues, if any, should be given to prompt this monitoring? What is the probability that intervention will make a difference on time-on-task? What is the probability that intervention will make a difference in achievement? These questions will be addressed in this study.
CHAPTER 2

Review of the Literature

Definitions of Attention Deficit Hyperactivity Disorder

Extensive research with the inclusion of Attention Deficit Disorder, first appeared in the Diagnostic and Statistical Manual of Mental Disorders (APA, 1980). Congress, in 1991, prior to reauthorization of P.L. 94-142, called for a synthesis of research on Attention Deficit Hyperactivity Disorder, and asked to disseminate findings to the public. James McKinney at the Miami University Center for Research on Attention Deficit Disorder reports that in just eleven years, over 1300 studies on assessment and identification of Attention Deficit Disorder alone were undertaken (1993). The database is so voluminous that four federally funded, national information clearing houses were established (see appendix A entitled Expanded Bibliography).

The literature follows two pathways. We find twice as many references under assessment/identification than under treatment/remediation. This is due to the difficulty educators and clinicians have in diagnosing and treating the disorder. Congress did not include Attention Deficit Disorder as a classification when considering the Individuals with Disabilities Education Act (IDEA) because of a lack of consensus on a definition, and inconclusive debate as to whether or not it is a learning disability. Due to this lack of consensus pertaining to diagnosis and treatment, I have used the district's Child Study Team's identification, and placement in this class as proof of eligibility for this study.
Much of the early research tried to distinguish between the terms Attention Deficit Disorder (ADD), Attention Deficit Disorder without hyperactivity (ADD noH), and Attention Deficit Hyperactivity Disorder (ADHD). Each term connotes a different perception of the disorder. In order not to confuse the issue, this author follows the convention of referring to Attention Deficit Disorder as a generic condition. Attention Deficit Disorder is now defined as "... developmentally inappropriate inattention, impulsivity, and hyperactivity... for his or her mental and chronological age" (APA, 1987). The criterion used is onset before the age of seven, and duration of at least six months. A child must exhibit three of the five symptoms of inattention, three of six for impulsivity, and two of five for hyperactivity. Appendix E outlines these symptoms.

Hamlett, Pellegrini and Conners (1987) found considerable confusion over this definition because many students showed inattention with no hyperactivity, and conversely, students who are hyperactive somehow are able to attend. Benjamin Lahey (1987) and his colleagues even conclude that impulsivity appears to be a correlate of excess motor activity rather than inattentiveness.

The American Psychiatric Association is currently field testing several options for DSM IV. The first is whether to divide the Attention Deficit Hyperactivity Disorder symptoms into two groups (inattention and hyperactivity/impulsivity) or to keep the same three behavioral constructs. The second option is to tighten the threshold for classification by expanding the number of the symptoms beyond the required eight to reduce the likelihood of over-identification. The argument is that observations in more structured settings like school are more reliable than observations at home or in the physician's office. A third option is to conceptualize Attention Deficit Hyperactivity Disorder and Attention Deficit Disorder without Hyperactivity (ADDnoH) as distinctly separate disorders with two lists of symptoms.
Regardless of which option is chosen, there is considerable consensus that inattention, impulsivity and excessive levels of activity are essential components of the disorder. Harvey Parker and the Council For Exceptional Children definitively add an inability to delay gratification as a fourth construct (1988). Significant discrepancy from normal children of the same age and gender on measures of these four behaviors, as well as severity and frequency) of the behaviors define eligibility for special education services (Barkley, 1990).

Relationship With Other Learning Disorders

What is the relationship between Attention Deficit Disorder and other learning and behavioral disorders? What are the educational characteristics of Attention Deficit Disorder? Not only does the lack of a workable definition retard child study teams from classifying students with the disorder, but the multiple symptoms associated with this condition mimic other learning disorders. Although Attention Deficit Disorder and many learning disabilities have been shown to be independent problems, Attention Deficit Disorder often, but not always, accompanies other learning disabilities. Ten percent of all children diagnosed as Attention Deficit Disorder have some other learning disability; up to eighty percent (80%) of learning disabled students have Attention Deficit Disorder as well (Holobrow & Berry, 1986; Lahey & Carlson, 1991; Safer and Allen, 1976; Shaywitz, et al., 1986).

The high prevalence rates for the coexistence of learning, behavioral, and emotional disorders place these children at greater risk for later school failure. However, as Beiderman, Newcorn, and Sprich (1991) pointed out, we still do not know whether school failure is related to the "psychiatric picture of inattention and
impulsivity (Attention Deficit Hyperactivity Disorder), cognitive deficits (a learning
disability), a combination of both factors (Attention Deficit Hyperactivity Disorder plus
learning disability), or perhaps other factors such as social disadvantage or
demoralization and consequent decline in motivation" (Beiderman, et.al., p. 572).
Roscoe Dykman and Peggy Ackerman (1991) found that greater than 50% of the
students diagnosed with Attention Deficit Disorder are "reading disabled." These
findings are supported by the work of many others (Felton, R.H. & Frank, B.W., 1989;
Halpern, J.M., et.al., 1984) The Chesapeake Institute concludes that the problem of
inattention combined with poor grades constitute the bulk of referrals for special

The literature on comorbidity (Attention Deficit Disorder & another learning
disability) is tenuous at best since most children identified as Attention Deficit
Disorder are referred to clinics while students with Learning Disabilities are diagnosed
by school personnel. Complicating matters is the fact that inattention is intermittent.
"The greater the demands made on the Attention Deficit Disorder condition, the
greater the level of hyperactivity," says Parker. "In the absence of excessive demands,
Attention Deficit Disorder students will sit still, attend, concentrate, comply with
demands, and meet expectations." (Parker, p.5). Given an interesting stimulus,
Attention Deficit Disorder students pay more attention than do students without
Attention Deficit Disorder. Sydney Zentall at Purdue University prefers to use the term
"attentional bias" rather than attention deficit. The latter term implies an inability or
lack of attention. He argues that Attention Deficit Disorder students choose to
selectively attend under certain situations or in reaction to a strong stimulus (Zentall,
1993). This statement has broad reaching consequences, since Attention Deficit
Disorder may actually be a misnomer!
What techniques should the classroom teacher use to keep Attention Deficit Disorder students on task? There are effective strategies which Mary Anne Prater calls "teaching behaviors" that are quick and take no additional time. She describes them under the headings of preparation for the lesson, gaining attention, questioning, and student involvement (1992).

Effects of Self Monitoring of Behavior

Karen Harris (1986) investigated the effects of self monitoring of on-task behavior and academic response rate among four learning disabled fourth grade students with significant attentional problems. Results indicated gains during self-monitoring of attention and self monitoring of production. The writer found this intriguing because, as Harris points out, research indicates that increased time-on-task does not necessarily improve academic performance (Klein, R.D., 1979; Vogelman, P.M., 1989). Educators argue that it is not only attending but making an active response that is crucial to learning. (Baer & Bushell, 1981; Graden, Thurlow & Ysseldyke, 1983). This finding became the stimulus for expanding Harris's work. If students with certifiable attention deficits do attend and can outperform students without Attention Deficit Disorder under certain conditions, what connection, if any, is there between time on task, attention and achievement for Attention Deficit Disorder students?

How can students make an "active response" and monitor themselves without taking up too much instructional time and teacher interruption? Robert Reid and Karen Harris (1993) addressed this question. Their study compared the effects of self-monitoring on attention and academic performance. Twenty-eight learning disabled students were taught a spelling study procedure (SSP), followed by instruction in self-monitoring of attention (SMA) and self-monitoring of performance (SMP). Students
had to use a spelling study procedure utilizing five steps: (a) look at the word, (b) say the word, (c) cover the word, (d) write the word three times, and (e) say it again.

Students were to follow recording procedures first outlined by Reid and Harris in an earlier work (1989). Clinical results showed that both SMA and SMP can significantly and meaningfully increase the level of observed on-task behavior of students with learning disabilities. The average percent of time on task was positively correlated with the number of correct practices in all treatment phases. On-task behavior was not significantly correlated with any other dependent variable. There was no significant increase in achievement, however. They point out that there has been only one group design study that has Attention Deficit Disorder addressed with achievement. "This underscores the need for the inclusion of measures of academic achievement in studies of self-monitoring conducted within an academic framework." (p. 37).

Summary

Attention Deficit Disorder is the most common neurobehavioral disorder of children. The A.P.A. definition of Attention Deficit Disorder is still valid for diagnosing the disorder, although considerable confusion exists in distinguishing between attention deficit disorder without hyperactivity (Attention Deficit Disorder-noH) and attention deficit disorder with hyperactivity (Attention Deficit Hyperactivity Disorder).

The three generally accepted constructs of Attention Deficit Disorder are inattention, impulsivity and hyperactivity. The Council for Exceptional Children adds an inability to delay gratification as a fourth feature. Findings conclude that the coexistence of Attention Deficit Disorder with other learning
disabilities places these children at considerable risk for school failure. The problems associated with inattention, coupled with poor academic performance, constitute the majority of referrals for special education.

Attention is a multidimensional concept that involves alertness, arousal, selectivity, and vigilance (sustaining attention). Attention varies with setting and task demands. Some studies indicate that a major problem for children with Attention Deficit Disorder is sustaining attention during boring, or repetitive tasks such as independent seat work or rote counting. Sydney Zentall at Purdue University concludes that given an interesting stimulus, Attention Deficit Disorder students may actually pay more attention than do students without Attention Deficit Disorder (1993).

A common limitation of most research is that many studies did not account for the comorbidity of Attention Deficit Disorder and other learning disabilities. Researchers, therefore, were unable to systematically determine the relationship between academic achievement and other variables. I found no studies that compare the educational characteristics of children with Attention Deficit Disorder compared to children with and without other types of disabilities who were placed in special education. In sum, the literature concludes that further research is needed in this area. A number of substantive procedural issues, however, must first be resolved that require ongoing professional discussion. Few studies report the academic achievement of students. Little information is available on the numbers and relative severity of performance problems across different academic subjects.

Robert Reid and Karen Harris collaborated to study self-monitoring of attention. They employ a self-recording strategy to keep students on task. This proves to be a good technique in a clinical setting to sustain attention, but more research is needed to
determine how this affects performance within regular education classrooms. This call to measure the relationship of time-on-task, its effect on attention and achievement became the framework for the present study. It employs the use of self-recording of attention, teacher monitoring of performance, and achievement measured by a pretest-post test design with classified students in a regular education classroom.
CHAPTER 3

Design of the Study

Subjects and Setting

The study was conducted in a large suburban school district in Southern New Jersey. Subjects were 52 students in two eighth grade American History classes. The experimental group was comprised of 25 students, 13 of whom were identified by the district's child study team as being learning disabled students (LDs') with symptoms of Attention Deficit Disorder. The other 12 students were non-learning disabled students (NLDs') without symptoms of Attention Deficit Disorder. This class participates in the inclusionary model with regular education students and mildly handicapped students learning together in the same classroom. Lessons are taught by a regular education teacher and a special education teacher providing in-class support. The control group was comprised of 27 students, all regular education students. The experimental group received cueing as an intervention, the control group did not. Both groups were taught the same content, using the same materials, with similar instructional strategies.

Characteristics of the study sample (n=52) follow. Sixty percent are female. Seventy-nine percent are white; ten percent are black, and nine percent "other" which include a mixture of diverse ethnic backgrounds. Two percent are Hispanic. Mean age is thirteen years, seven months old. Within the learning disabled subgroup, seven have average IQ, one had from average to low-average IQ, and two had below average
IQ, as measured by the Wechsler Intelligence Scale for Children (1992 ed). A review of records reveals that eleven have mild to moderate attention problems, and two have moderate to severe symptoms of attention deficits.

**Intervention Design**

Figure 1. shows the intervention design. This study uses two sets of comparisons. First a comparison of learning disabled students (designated Subgroup LD) with non learning disabled students (designated Subgroup NLD) receiving the same intervention. Second, a comparison of both sets of students from the experimental group (designated as EXP Group) with the control group (designated as CON Group). I did not have a fully crossed design in which each cell had subjects.

A serious limitation was sample size. The small number meant I had limited power to detect an effect, if the effect is present. Therefore, this study depends heavily on descriptive analysis, and the results are shown in graphic form. Since all of the children come from the same socio-economic background, there is little variability in social-economic status. Statistical analysis will be used when the sample size permits. For example, I will use the T test when comparing group means. When comparing the subgroups, however, I will rely on descriptive analysis.
Figure 1:

Intervention Design

*Note the empty cell
Measures

Measure 1: Attention

The two characteristics being studied are attention and academic achievement. Attention was assessed by four on-task behaviors: 1) looking at the speaker, 2) looking at the board, 3) looking at their paper, or 4) writing. Students were observed in their American History class during the month of October, 1994. Four observations per day for seven days were recorded on the Teacher Monitoring Form (see appendix B). Intervention was then initiated.

Upon hearing a tone, Students recorded their on-task behavior on a rating scale designed by the investigator. Many studies in the literature of this type ask the student to record either "yes" or "no" for paying attention. I felt middle school students could be more specific, and devised a form which not only tells me if they were paying attention, but also in what manner. The form had a line for each of the twenty-one trials, and a column for each behavior noted above. The last column was headed "off-task" and students would check this column if they were not doing one of the behaviors listed. See Student Monitoring Form (See appendix C).

A student who exhibits on-task behavior seventy percent of the time is defined as paying attention.

Preliminary work to establish interrater reliability was done. Both regular and special education teachers observed the experimenter watching a video. I alternated demonstrating on-task and off-task behaviors. Using the Teacher Monitoring Form, both teachers recorded whether my behaviors were on-task or off-task. Teacher "A" recorded 10/10 behaviors correctly, while teacher "B" recorded 9/10 correctly, giving an interrater reliability of 95%.
Measure 2: Achievement

A pretest/post test comparison was used to measure academic achievement. A gain in achievement is defined as any gain in score from pretest to post test.

At both pre and post intervention phases, a chapter test from their textbook America's Story was administered to assess performance. Form A was given before cueing began, and form B was given after the intervention phase ended. The publisher provides no data on test-retest reliability. The test, entitled English Colonies Thrive in North America, consisted of twenty, multiple choice, questions test designed to test knowledge of key facts in the chapter. (See appendix D).

Procedures For Assessing Attention

The experiment was conducted during regularly scheduled forty-three minute periods in the pupil's regular education classroom for fifteen days in the fall of 1994. The students were only told that the teacher was trying a new strategy he learned for getting students to pay more attention to their work.

During the first week a baseline for attention was established. On-task behavior was measured by the percentage of time a student was exhibiting one of the four behaviors listed above. The stimulus used by the special education teacher to record observations was a pre-recorded tape that only he could hear. The tape directed him to look at a particular student, then on the command "record" he was to check whether or not the student was on-task. A different student in rotation was observed by the special education teacher for one second at twenty-second intervals. This
amounted to four observations for every student in the class each day for seven days, or a total of twenty eight observations. Students were unaware that they were being watched, and believed the observer was doing some important work for the teacher. Since there was a lack of informed consent on the part of the students, the teachers chose not to discuss results with them.

Baseline for achievement was established by averaging the test scores on the three previous chapter post tests taken in September & October, 1994.

Self-recording procedures first established by Hallahan and his colleagues were used. Prior to intervention, the importance of paying attention was discussed with all participants, and audible clues as a technique to help them pay attention were demonstrated.

Cueing is a well established intervention for assessing attention among students. Each time a student heard a randomly emitted tone from a tape recorder (average interval 60 s; range 30-90 s), he or she was to first ask, "Was I paying attention?" and then record if he or she was on-task. On-task behaviors were the same as for the Teacher above: looking at speaker, looking at board, looking at paper, writing, or off-task). Students placed a check mark in the proper column on the Student Monitoring Form. Cueing was done twenty one times (first was practice and discounted in analysis) each day for eight days for a total of 160 trials. After the initial practice tone, students used the cueing procedure independently. The special education teacher monitored compliance with the procedure; no refusals or failures to follow procedures were noticed.

The control group did not receive an audible cue, and did not monitor itself. The
teacher recorded on-task behavior following the same procedure as for the experimental group.

At the close of each period, the teacher collected the student's recording sheet. The number of times on-task for each student, and a percentage of time the students spent on task each day was calculated. A total time-on-task was calculated after baseline phase and again after the intervention phase. Each subject's percentage of attention was compared to the average for the learning disabled subgroup, the non-learning disabled subgroup and the control group.

Procedures for Assessing Achievement

Academic achievement is defined in this study as the percentage of correct responses on the post test (Po) minus the percentage of correct responses on the pretest (Pr). The result is gain (loss) expressed as a percent correct of the total number of questions answered.

Testable Hypotheses

Variable 1: attention

Hypotheses 1a:

The first hypothesis stated was: There will be no difference in average attention for students who self record their on-task behavior (OTB) than for students who do not.
Hypothesis 1b:

The second hypothesis regarding attention was: There will be no difference in attention as measured by teacher recorded observations between learning disabled students and non-learning disabled students receiving the same intervention (cueing).

Variable 2: Achievement

Hypothesis 2.a:

No difference will be found in achievement scores, as measured by pretest-post test gains, between students who self-record their on-task behavior than for students who do not.

Hypothesis 2.b

No difference will be found in achievement, as measured by pretest/post test gains, between learning disabled students and non-learning disabled students receiving the same intervention (cueing).

Summary

This is a descriptive study utilizing an intervention design with pretest/post test measurement of achievement. Because of the small sample size, I will use descriptive statistics (mean, standard deviation, and range) to compare the average difference post test score between learning disabled students and non-learning disabled students within the experimental group. I will calculate the mean for the control group then compare it to the mean of Learning Disabled subgroup. I will graph the time-on-task for selected learning disabled subjects before and after intervention.
CHAPTER 4.
Analysis of Results

The purpose of this study is to determine if self-recording of student's on-task behavior after cueing improves performance in eighth grade learning disabled students, all of whom have some degree of attention deficit disorder. It attempts to answer the broad question, would performance levels rise if we could keep learning disabled students on task?

The experimental group (n=25), was a mixture of perceptually impaired learning disabled students (LD subgroup; n=13) with average to below average abilities on the Wechsler Intelligence Scale for Children and regular education students (non-learning disabled subgroup; n=12) with average to high average ability. The CON Group (n=27) was comprised of all regular education students with average to high average ability. Both classes were alike in all other respects, confirmed by a review of records by the special education teacher. The regular education teacher reports that instruction was the same for both groups.

Attention Results

Hypotheses 1a:

The first hypothesis stated there will be no difference in average attention for students who self record their on-task behavior (OTB) than for students who do not.
Table 1 reflects the results of student self-recording of on-task behavior. Mean percentage of on-task behavior during baseline period and intervention period is shown for both groups. Baseline was established for the experimental group. In the pre-intervention phase, teacher monitoring on-task behavior for each student produced 28 trials (four observations times seven days). Pre-intervention percentage of on-task behavior for the experimental group was 65% across all trials, with a standard deviation of 17. Eight days of intervention resulted in 32 observations. Following intervention, the mean score for the experimental group was 76% with a standard deviation of 16, resulting in a gain of 11% with a standard deviation of 13. The mean score for the control group during baseline phase was 57% with a standard deviation of 27. Following the intervention phase, the mean score for the control group was 74%, with a standard deviation of 7, resulting in a gain for the control group of 17% with a standard deviation of 26.4. Attention was compared using a t-test procedure. The t-test results yielded a significant difference at the .01 level ($t(50) = 7.2$, $p < .01$). Results indicated we could reject the null hypothesis of no difference between group

\begin{table}[h]
\centering
\begin{tabular}{|c|c|}
\hline
\textbf{Attention Gains} &  \\
\hline
\end{tabular}
\caption{Mean gain in percent for teacher-monitoring of attention following the intervention phase.}
\end{table}
Table 1

Attention gains and range for all groups

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<tr>
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<th>LD subgroup</th>
<th>NLD subgroup</th>
<th>CON group</th>
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<tr>
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<td>low</td>
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</table>

EXP = experimental group
LD = learning disabled subgroup of the experimental group
NLD = non-learning disabled subgroup of the experimental group
CON = control group
n = number in group
x = mean gain
s = standard deviation
high = highest point gain for group
low = lowest point gain for group
Hypothesis 1b. results:

The second hypothesis regarding attention was: There will be no difference in attention as measured by teacher recorded observations between learning disabled students and non-learning disabled students receiving the same intervention (cueing).

Results for the experimental group were presented for two subgroups. The learning disabled subgroup (n=13) had a mean baseline score of 58%, with a standard deviation of 15. Post Intervention score of 74% with a standard deviation of 13 resulted in a gain of 16%, with a standard deviation of 15.3. The Non-LD subgroup (n=12) had a mean baseline score of 73%, with a standard score of 11 and a post intervention mean score of 78%, with a standard deviation of 8, a gain of 5% with a standard deviation of 10. A test of independent samples allowed us to reject the null hypothesis of no between group difference in achievement gain. The learning disabled group gained more, although they performed at lower levels on both pretest and post test relative to the non learning disabled subgroup. The corresponding t-test (t(50) = 7.74, p.<.01) shows highly significant gains in attention for the LD group. Because of small group sizes, however, the results are not very stable.

Measures of central tendency also compare scores for each group. The experimental group gains show a relatively normal distribution of scores, with a spread of 63 percentage points (mean = 11%, range = 63 points, high = 49, low = -.14). The control group, which all cluster around the average IQ, showed a spread of 101 percentage points. (mean = 17%, median = 17.5%, range =101 points, high = 73%, low = -.28%).
Gains were graphed to compare the difference in attention between pre-intervention and post-intervention for the learning disabled subgroup. Figure 2 indicates the spread was 52 points with a range of -0.03 to 0.49. The median was 12, and the mode was 07. Two students (21L and 14L) placed in the top 1/3 of the range (.33 to 0.49) while the majority (7/13; 53%) of the students placed in the bottom 1/3 of the range of -0.03 to 0.14. The remaining 4 students showed average gains. Only one student (15L) showed a loss of time-on-task following intervention. He showed a negative gain of -3%. Scores generally fell on the normal curve. One student was above the average gain, one below average, and the rest fell within the average range. Almost everyone showed improvement.

The Non-learning disabled subgroup was markedly different. The spread was only 37 percentage points (range = -0.14 to 0.23), the median was 5.5% and the mode was -1%. One third of the students showed a loss of time-on-task, with two students falling 3+ standard deviations below the mean. One student (12N) showed a negative gain of -14%. For him, cueing was a distraction. Fewer showed improvement, and a sizable percentage showed a loss in attention.

Achievement Results

Hypothesis 2.a:

There will be no difference in achievement scores, as measured by pretest-post test gains, between students who self-record their on-task behavior than for students who do not.
Figure 2
Attention Gains for LD subgroup following intervention phase

- Pre int.
- Post int.

Students
Baseline was established for both groups by use of the pretest described above. The average pretest score for the EXP group was 77%. The average post test score was 85%, a gain of 8%. Pretest average scores for the control group were 72% and post test average scores were 80%, also a gain of 8%. A t-test of mean differences (t-test for independent samples) did not allow us to reject the null hypothesis of no difference ($t(50) = 0.9, p > .05$).

<table>
<thead>
<tr>
<th>Mean Achievement Gains</th>
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</thead>
</table>

Hypothesis 2b:

The second hypothesis for achievement was: No difference will be found in achievement, as measured by pretest/post test gains, between learning disabled students and non-learning disabled students receiving the same intervention (cueing).

The experimental group was further divided into the learning disabled subgroup and the non-learning disabled subgroup for achievement. The LD subgroup had pretest average of 73%, and post test average of 82%, a net gain of 9%, with a standard deviation of 3. The Non-LD subgroup had a pretest average of 81%, and post test average of 88%, a net gain of 6% and a standard deviation of 4. Again, as with time-on-task, the difference in mean gain between the two subgroups was significantly different from zero ($t(23) = 3.2, p > .01$).
Table 2 shows the mean gain, in percent, for achievement on post test following intervention phase.

Achievement gains and range for all groups

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<td>-3.</td>
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EXP= experimental group
LD= learning disabled subgroup of the experimental group
NLD= non-learning disabled subgroup of the experimental group
CON= control group
n= number in group
x= mean gain
s= standard deviation
high= highest point gain for group
low= lowest point gain for group
These results indicate that mean scores for the learning disabled subgroup were greater than mean scores for the control group following the baseline phase (.73>.72) as well as intervention phases (.82>.80). Although T-test comparison shows no statistical significance, due to small sample size, these results suggest that learning disabled students, when cued, can perform as well or better than regular education students. More discussion of this finding will follow.

As with on-task behavior, measures of central tendency are used to compare achievement gains among groups. Mean and median scores were not statistically different for both the experimental and the control groups. What was different, however, was the range of scores within each group. Gains for the experimental group ranged from a high of 13 to a low of -3. Gains for the control group ranged from a high of 20 to a low of 3. Although both groups had a 17 point spread, the control group had higher gains. Six students fell 2 or more standard deviations above the mean, compared to only 4 students for the experimental group. One student had a negative gain for the experimental group, whereas the control group had no students below zero.

When comparing achievement gains between the learning disabled subgroup and the non-learning disabled subgroup, we see an obvious difference. Figure 3 shows the range for achievement gain for the learning disabled subgroup was a high of 13 points and a low of 4. The range for the non-learning disabled was a high of 11 and a low of -3. When ranked, the top four places belong to the learning disabled group.
Figure 3
Comparison of achievement gain
for LD subgroup and NLD subgroup

Students
What correlation, if any, is there between attention and achievement?

A scatter gram was drawn to show the bivariable relationship between attention and achievement for both groups. It is read clockwise and is divided into four quadrants. Dotted mean lines are drawn for attention and achievement.

[insert figure 4 here]

Correlation between Attention and Achievement

Quadrant I (upper right) shows those students from the experimental group who had a positive gain in both attention and achievement. Student 25L was the top achiever with a 13 point gain on post test, and 26% gain in on-task behavior following intervention. Student 13L also scored a 13 point gain on the post test and 24% gain in time-on-task. Student 14L scored a 12 point gain on post test and 39% gain in time-on-task. Note that only two students from the Non-LD group placed in this quadrant.

Quadrant II (lower right) had a positive gain in achievement, but a loss for attention. Student 1L was the only one of the top four achievers to score below the mean gain of 11% for attention. She was absent the first day of intervention, which may account for her low attention score.

Quadrant III (lower left) shows students falling below the mean for both attention and achievement. Only one student (8L) from the learning disabled subgroup appears here. His teacher confirmed that he rarely pays attention. Still he had a slight gain in attention (2%) and improved by 4 points on the post test.
Correlation between Achievement and Attention for two Subgroups

Achievement Gain (in Points)

Attention Gain (in Percent)
Quadrant IV (upper left) shows students with a gain in attention, but little gain in achievement. There is only 1 student in this quadrant (16L), and he falls so close to the means for the group, that this inverse relationship could be due to any number of reasons. It is important to note that although he falls in this quadrant because he is compared to gains made by the group, he still had a seven point gain in post test score.

Summary

Data Analysis suggests these findings:

1. There was a significant difference between the mean of the experimental group and the mean of the control group for attention.

2. There was a significant difference between the mean of the learning disabled subgroup and the non-learning disabled subgroup for attention.

3. There was no difference between the mean of the experimental group and the mean of the control group for achievement.

4. There was a significant difference between the mean of the learning disabled subgroup and the non-learning disabled subgroup for achievement.

These findings are presented symbolically on the next page.
Table 3

Test of Hypothesis

Legend:

Group EXP= experimental group receiving intervention
Group LD= Subgroup of learning disabled students within the experimental group
Group NLD= Subgroup of non-learning disabled students within the experimental group
Group CON= Control Group receiving no intervention

M= Mean

<table>
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<tr>
<th>Hypothesis</th>
<th>t-test estimate</th>
<th>Significance level</th>
<th>Accept or reject</th>
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</table>

| Variable 2: Achievement |               |                    |                  |
| $H_0$ 2.a: $M_{exp} = M_{con}$ | 0.91           |                    | accept           |
| $H_0$ 2.b: $M_{ld} = M_{nld}$ | 3.28            | .01                | reject           |
Many students with Attention Deficit Disorder are in regular education classrooms. The literature suggests that some sort of self-monitoring of attention levels is related to improvement in performance in the classroom. Cueing has been proven a good technique to monitor on-task behavior. This study was done as a result of a call for more research to determine how self-monitoring affects performance of learning disabled students within regular education classrooms (Harris, 1986).

The Research Questions Addressed

Five research questions asked at the beginning of this thesis can now be addressed.

(1). Does self-monitoring of attention improve achievement in eighth grade learning disabled and non-learning disabled students? In a word, yes. Gains for the learning disabled subgroup matched those of the control group. More impressively, the learning disabled subgroup had gains three times higher than the non-learning disabled subgroup receiving the same intervention. This suggests that although most students will improve their attention level with self-monitoring, this technique is even more useful for learning disabled students in general, and those having Attention Deficit Disorder in particular.
(2) Are students capable of monitoring their own behaviors? Students reported to their teacher that they got tired of the audible cues after eight days, but were glad to have a routine. Four students in the control group and one student in the experimental group experienced lower levels of on-task behavior after intervention. This suggests they were distracted with cueing.

(3) What is the probability that intervention will make a difference on time-on-task? On-task behavior improved significantly for most students whether they were in the experimental group or the control group. Over 96% (47/52) of the students in this study demonstrated increased time-on-task. Seventy percent of the control group (19/27) and seventy two percent of the experimental group (18/25) met a minimum standard for paying attention at least 70% of the time.

(4) What cues should be given to prompt this self-monitoring. Audible cues for an individual student are easily implemented. When done on a class basis, it becomes more difficult. A stimuli that would arouse more than one sensory modality would be ideal, but logistically, this is impossible. The teacher reports that he tolerated the distraction for the short run, but would hesitate to do it over a long period of time. I don't know if other forms of cueing would produce the same result.

(5) Finally, what is the probability that intervention will make a difference on achievement? Although the half-percentage point difference in mean gains for achievement between the experimental and the control groups was not different from zero, a comparison between gains in performance for learning disabled subgroup and the non-learning disabled subgroup show: their ten point gain was higher than that of the control group. Learning disabled students placed in the top 4 positions for achievement gains for the entire group.
Qualitative Information: Teacher Interview

The teacher reports other benefits stemming from this study. He is now looking for signs of inattention. He’s added extra cues to bring students back on task. He’s encouraged individual students to self-monitor. He now gives one student (1L) who scored one of the highest gains for achievement extra visual cues if she answers correctly. He feels attention levels peaked during the intervention phase, and it has had a lasting influence on the class. Learning disabled students are now taking advantage of extra help. The special education teacher has begun to observe students more closely in other classes.

Implications For Future Research

Students had to indicate how they showed on-task behavior. A content analysis of responses was done. Eighty-one percent of the time they were either looking at the teacher, or at the board. Looking at their paper or writing accounted for only nineteen percent of the time. The first two behaviors are passive. The latter two are active. One only has to wonder how much more students with attention deficit could achieve if they spent more time in active learning. This would be a meaningful follow-up to this work.

How could students who appear not to be paying attention do well on tests? Six students in both groups had low attention but high achievement gains. This could be answered in one of two ways. Either they have an innate ability to do well on tests, or their learning style is more auditory than visual, which is not easily detected by teacher observation. This hypothesis, however, could be easily tested. Do auditory
learners pay more attention and perform better than visual learners? This, too, would be worthwhile research.
### Appendix A

#### Expanded Bibliography

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*Note: This table is a sample and does not reflect actual data.*
Appendix A

Expanded Bibliography

Page 2 of 3
## Appendix A

### Expanded Bibliography

**Page 3 of 3**

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Appendix B

Teacher Monitoring Form

Teacher-Monitoring Checklist

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<th>B</th>
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<th>App</th>
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Directions: When you hear the audible tone, place a check mark in each column for behaviors observed. You may have checkmarks in more than one column. Draw a line through the columns if you missed the observation. Leave blank if student was not exhibiting any of the behaviors. Examples:

- looking at SPEAKER
- looking at BOARD and WRITING
- LOOKING AT PAPER
- not paying attention - OFF TASK

missed observation

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DATE

STUDENTS

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RATER'S NAME
**Appendix B: Student Monitoring Score Sheet**

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Directions: When you hear the audible tone, check one or more of the ways you were paying attention.

- If you were looking at the speaker, check column A.
- If you were looking at the board, check column B.
- If you were thinking about the lesson (and only about the lesson), check column C.
- If you were writing notes (about the lesson, not anything else) then check column D.
- If you were not doing any of these things, you are "off-task". Check column E.

You must record a checkmark every time you hear the tone. If you are out of the room, or could not participate, draw a line through all columns for that line.

**Column Details**

- **Column A**: Looking at the speaker
- **Column B**: Looking at the board
- **Column C**: Thinking about the lesson
- **Column D**: Not paying attention
- **Column E**: Missed this recording
- **Column F**: Writing only

**Example:**

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Appendix C

Student Monitoring Form
**Appendix D**  

**English Colonies Thrive In North America**  

**Page 1 of 2**

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**CHAPTER 4 | English Colonies Thrive in North America**

Choose the best answer for each item. Completely fill the circle for that answer in the answer column.

**Vocabulary and Key Terms**

1. People who disagreed with the religious services of the Church of England were (A) dissenters, (B) reformers, (C) burghers, (D) Huguenots.

2. A government where people choose those who make laws is (A) a divine right, (B) the Crown, (C) representative, (D) a compact.

3. A Maryland law prohibiting persecution of Christians because of their beliefs was the (A) Fundamental Orders, (B) Mayflower Compact, (C) "Holy Experiment," (D) Act of Toleration.

4. Some settlers viewed Indians as heathens because they (A) did not accept Christianity, (B) fought for their land, (C) made friends with the French, (D) depended on game for clothing.

5. The people who founded Plymouth are known as (A) Puritans, (B) Pilgrims, (C) Quakers, (D) Huguenots.

**Comprehension**

6. Many Europeans settled in America in the 1600's because (A) they hoped to find religious freedom, (B) there were few hardships, (C) African slaves did the hard work so life was easy, (D) they wanted to establish the Church of England.

7. Many English people went to America in the 1600's because (A) there were no taxes, (B) they would not have to pay taxes, (C) the leaders there ruled by divine right, (D) they were dissatisfied with their government.

8. Tobacco farming was (A) outlawed in Jamestown, (B) forced on settlers by King James, (C) never successful in Jamestown, (D) an important step toward Jamestown's success.

9. The settlement at Plymouth (A) survived for only a few years, (B) grew rapidly in its first year, (C) became strong and successful, (D) succeeded because of its quality tobacco.

10. The Massachusetts Bay Colony was founded by (A) English Puritans, (B) Pilgrims, (C) John Smith, (D) French Huguenots.

11. Rhode Island guaranteed all its people (A) voting rights, (B) religious freedom, (C) large plots of land, (D) equal rights.

12. When Georgia was first settled, it outlawed (A) farms of 50 acres, (B) slavery, (C) poor people, (D) trade with England.
Appendix D

English Colonies Thrive in North America

Page 2 of 2

NAME ____________________________

Chapter 4 continued

Chapter 4 continued

13. Pennsylvania was founded as a (A) Swedish colony, (B) Dutch colony, (C) private colony, (D) "Holy Experiment" by Quakers.

14. When pioneers on the frontier destroyed game and cut down forests, they (A) were punished by the government, (B) helped Native Americans clear the land, (C) were ordered back to the cities, (D) met with resistance from the Indians.

15. In King Philip's War, the (A) Spanish defeated the English, (B) Indians helped the French, (C) Indians destroyed settlements in Massachusetts Bay Colony, New Hampshire, and Maine, (D) French defeated the English.

Skills

Suppose that when you read about the founding of Pennsylvania by William Penn, you made this hypothesis: Colonists in Pennsylvania had a great amount of freedom. Later, you find that Penn established laws for people in Pennsylvania. Study the laws below. Then choose the best answer for each item.

To guard against whatever could tempt the people to intemperance, . . .
insolence, rudeness, unkindness, and scandalous living; all unlawful plays, suppers, games of cards, masquerades, all cursing, swearing, lying, bearing of false witness (since an oath is not allowed). . . . dicing, and stealing, are forbidden under pain of the severest punishment.

For the more convenient bringing up of the young, the solitary farmers living in the province shall all remove to the market towns . . .

All workmen shall be content with their definite stipulated wages. Each child that is twelve years of age shall be put to some handcraft or other honorable trade.

16. One activity forbidden by Penn was (A) drinking ale, (B) practicing other faiths, (C) religious plays, (D) playing cards.

17. Those who were forced to move to market towns were (A) the church staff, (B) manufacturers, (C) farmers, (D) child laborers.

18. All workmen had to (A) live in towns, (B) accept stipulated wages, (C) tempt people to intemperance, (D) produce handcrafts.

19. Among those required to work at a craft or trade were (A) all of the people, (B) children over the age of twelve, (C) convicts, (D) farmers in market towns.

20. A better hypothesis than the one you made would be (A) only religious groups had much freedom, (B) colonists had no limits on their freedoms, (C) children had no limits on their freedoms, (D) colonists had limited freedoms.

Essay

Answer one of the following questions in a well-organized paragraph using complete sentences. Write your essay on a separate sheet of paper.

1. Why did people settle in the English colonies in the 1600's?

2. What factors were responsible for the success of Jamestown?
Appendix E

Symptoms of Attention Deficit Disorder

Page 1 of 2

Note: Consider a criterion met only if the behavior is considerably more frequent than that of the most people of the same mental age.

A. A disturbance of at least six months during which at least eight of the following are present:

(1) often fidgets with hands or feet or squirms in seat (in adolescents, may be limited to subjective feelings of restlessness.
(2) has difficulty remaining seated when required to do so
(3) is easily distracted by extraneous stimuli
(4) has difficulty in awaiting turn in games or group situations
(5) often blurts out answers to questions before they have been completed
(6) has difficulty following through on instructions from others (not due to oppositional behavior or failure of comprehension), e.g., fails to finish chores.
(7) sustaining attention in tasks or play activities.
(8) often shifts from one uncomplicated activity to another
(9) has difficulty playing quietly
(10) often talks excessively
(11) often interrupts or intrudes on others, e.g., butts into other children’s games
(12) often does not seem to listen to what is being said to him or her
(13) often loses things necessary for tasks or activities at school or at home
Appendix E
Symptoms of Attention Deficit Disorder
page 2 of 2

(14) often engages in physically dangerous activities without considering possible consequences (not for the purpose of thrill seeking), e.g. runs into street without looking.

Note: The above items are listed in descending order of discriminating power based on data from a national field trial of the DSM-III-R criteria for Disruptive Behavior Disorders.

B. Onset before age seven.

C. Does not meet the criteria for Pervasive Developmental Disorder.

Criteria for severity of Attention-deficit Hyperactivity Disorder:

mild: Few, if any, symptoms in excess of those required to make the diagnosis and only minimal or no impairment in school and social functioning.

Symptoms or functional impairment fluctuate between "mild" and "severe."

Severe: Many symptoms in excess of those required to make the diagnosis and significant and pervasive impairment in functioning at home or school and with peers.

References


